TERMITES OF THE MARQUESAS ISLANDS *

By

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INTRODUCTION

Edward P. Mumford, Director of the Pacific Entomological Survey, has kindly asked me to study and report on the termites collected by the Survey. Mr. Mumford and his colleague, A. M. Adamson, are to be congratulated on a most interesting and valuable collection. It is well preserved, furnished with careful locality and habitat notes, and above all is remarkable for the number of collections containing all castes, alates, soldiers, and nymphs or workers.

No termites have previously been reported from the Marquesas. Seven species are represented in the present collection, of which three are considered to be new. One striking species represents a new subgenus, *Metaneotermes,* of *Kalotermes* sensu latiore (see page 77). I take pleasure in naming one of the new species for Mr. F. C. Atherton, President of the Hawaiian Sugar Planters' Association, and one for Mr. James Dole of the Association of Hawaiian Pineapple Canners, because of the interest and support which these men and their associations have given to the Survey.

Even more important than the additions to the known species is the insight into distribution and faunal affinities which arises from the presence in the collection of species previously known from other regions. A close relationship between the Hawaiian and Marquesan faunas seems strongly indicated by the finding in the Marquesas of all three of the endemic Hawaiian species, *Kalotermes* (*K.*) *immigrans* Snyder, *K.* (*Neotermes*) *connexus* Snyder, and *K.* (*Cryptotermes*) *piceatus* Snyder. Extremely interesting also, and perhaps of economic significance, is the finding of a species of *Coptotermes* far to the east in the Pacific islands, the nearest reported indigenous species being found in distant New Hebrides. The general affinities of the fauna are with that of the Papuan region, with no indications of any relationship to the Neotropical region. The *Coptotermes,* for example, is of a type quite different from the species known from the Americas and of the type common to the Papuan and Indo-Malayan region, very close indeed to the common species of the Philippines, *Coptotermes vastator* Light.[17] There remains, of course, the possibility that it actually is this spe-

[17] Light, S. F., Notes on Philippine termites, 3: Philippine Jour. Sci., 40, pp. 421-453, 1929.

* Pacific Entomological Survey Publication I, article 6.

cies, for it has been intercepted several times in the plant quarantine station at Honolulu. Indeed, the ease with which termites may be transported calls for caution in the interpretation of distributional data until much more complete information is available.

I wish to express my appreciation of the coöperation of Gerald F. Hill, Senior Entomologist of the Division of Economic Entomology, Canberra, New South Wales, Australia, who has made numerous contributions to our knowledge of the termites of the Pacific islands.[18] Mr. Hill has sent me valuable material for comparisons and has himself kindly examined examples of the species in the Pacific Entomological Survey collection and confirmed my diagnoses.

Following is a list of the species in the collection, with the distribution of each. Previously known distribution is given in parentheses.

1. *Kalotermes* (*Kalotermes*) *immigrans* Snyder (Hawaii, Fanning Island, Washington Island). Marquesas: Hivaoa; and Jarvis Island.
2. *Kalotermes* (*Neotermes*) *connexus* Snyder (Hawaii; collected by the Pacific Entomological Survey on Moorea, Society Islands). Marquesas: Hivaoa, Tahuata, Fatuhiva, Nukuhiva, Uahuka, Uapou, and Eiao.
3. *Kalotermes* (*Metaneotermes*) *athertoni,* new subgenus and species, Marquesas: Hivaoa, Tahuata, Fatuhiva, Nukuhiva, Uahuka and Uapou.
4. *Kalotermes* (*Cryptotermes*) *dolei,* new species, Marquesas: Hivaoa, Fatuhiva, Mohotani, Nukuhiva, Uahuka, Uapou, and Eiao.
5. *Kalotermes* (*Cryptotermes*) *hermsi* Kirby[19] (Fanning Island). Marquesas: Hivaoa and Tahuata.
6. *Kalotermes* (*Cryptotermes*) *piceatus* Snyder (Hawaii, Hongkong?). Marquesas: Hivaoa.
7. *Coptotermes pacificus,* new species. Marquesas: Hivaoa.

Genus **KALOTERMES** Hagen sensu latiore

Subgenus **KALOTERMES** sensu stricto

Kalotermes (K.) immigrans Snyder (fig. 21, *a-e*).

Kalotermes immigrans Snyder, U. S. Nat. Mus. Proc. 61, pp. 2, 3, pl. 4, fig. 15, 1922.

Five collections from Atuona, Hivaoa, must be considered to belong to this species, although the alates from the Marquesas are larger than those in my collection from Hawaii and differ in other minor details. The soldiers agree very closely.

Four of the collections were of swarming alates and one was a nest series. The swarming alates were taken from February 15 to June 6 and are evidently night fliers, for they were taken about lights.

[18] Hill, G. F., Isoptera: Insects of Samoa, pt. 7, fasc. 1, pp. 1-18, 1927. Termites from the Australian region: Nat. Mus. Melbourne Mem., pt. 1, no. 7, pp. 5-119, 1927.

[19] Kirby, Harold, Jr., *Cryptotermes hermsi* sp. nov., a termite from Fanning Island: Univ. of California Pub. Zool. 26, pp. 437-441, 1925.

Kalotermes immigrans was thought to have been introduced into Hawaii, as the specific name indicates, but its distribution as now known, from the Hawaiian islands to the Marquesas through Fanning and Jarvis islands,[20] seems to render introduction into Hawaii less probable. *Kalotermes immigrans* is not known to be a house termite or to do damage to poles, but it has been reported as damaging living coffee plants in Hawaii.

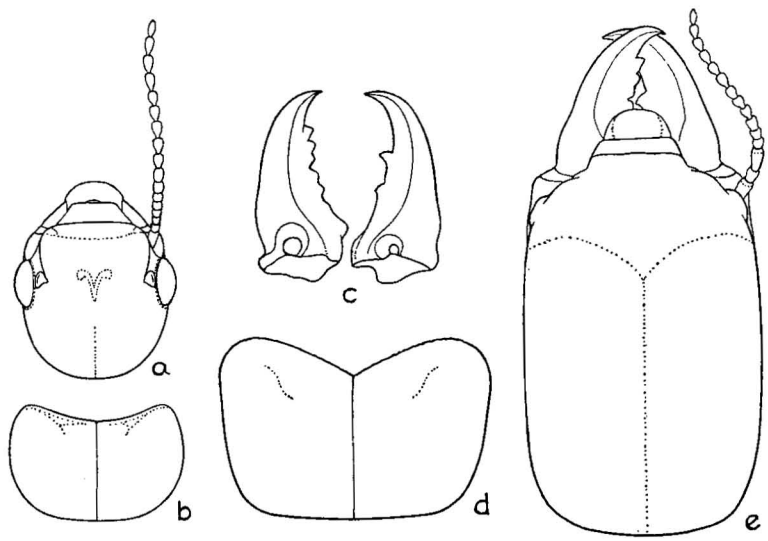


FIGURE 21. *Kalotermes* (*K.*) *immigrans* Snyder: *a*, head of alate; *b*, pronotum of same in natural position; *c*, mandibles of soldier; *d*, pronotum of soldier; *e*, head of soldier. Drawings from camera lucida outlines with parts in dorsal view, all at the same magnification.

Measurements in millimeters of alates of *Kalotermes immigrans* Snyder from Atuona Valley, Hivaoa:

	With Wings	Without Wings
Length over all	13.50	.....
Length of body	.....	9.00
Length of head	.....	1.81
Width of head	.....	1.52
Pronotum length, maximum	1.01	0.93
Pronotum length, minimum	0.93	0.88
Pronotum width	1.62	1.60
Long diameter of compound eye	0.44	0.40
Short diameter of compound eye	0.42	0.38
Length of hind tibia	.....	1.22
Length of forewing	10.50	.....
Width of forewing	3.00	.....

[20] A collection of this species given to me for study some time ago by Bernice P. Bishop Museum was made by L. A. Whitney in timbers of the wrecked schooner *Amaranth* at Jarvis Island in 1924 [Whippoorwill Expedition].

Measurements in millimeters of a soldier of *Kalotermes immigrans* Snyder from Atuona Valley, Hivaoa:

Length of head capsule	3.61
Length of head (with mandibles)	5.09
Pronotum width	2.50
Pronotum length, maximum	1.67
Pronotum length, minimum	1.30
Gula length	2.73
Gula, maximum breadth	0.74
Gula, minimum breadth	0.46
Head width	2.27

Subgenus **NEOTERMES** Holmgren

Kalotermes (Neotermes) connexus Snyder (pl. 1, *D;* fig. 22, *a-e*).

Kalotermes connexus Snyder, U. S. Nat. Mus. Proc., 61, pp. 9-11, figs. 3 and 4, pl. 4, fig. 16, 1922.

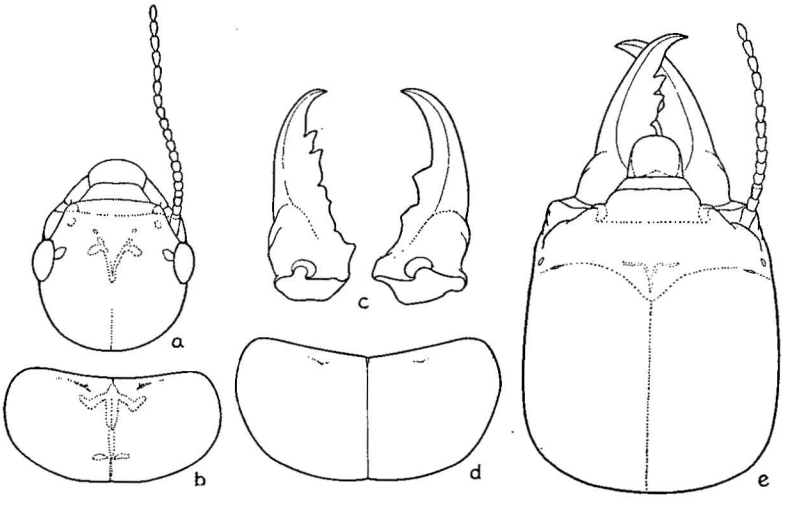


FIGURE 22. *Kalotermes (Neotermes) connexus* Snyder: *a,* head of alate; *b,* pronotum of alate spread flat; *c,* mandibles of soldier; *d,* pronotum of soldier; *e,* head of soldier. Drawings from camera lucida outlines with parts in dorsal view, all at the same magnification.

The most conspicuous element in the collections is a large species showing much variation in both alate and soldier castes which I have identified with the Hawaiian *Neotermes, Kalotermes (N.) connexus* Snyder, although certain minor differences appear.

This species was taken by the Survey three times on Moorea, Society Islands, and although the collections include none from Tahiti, it seems certain that future collections will demonstrate its presence there. It was taken

76 times in the Marquesas, as follows: Hivaoa, 24 collections; Tahuata, 10 collections; Fatuhiva, 9 collections; Nukuhiva, 1 collection; Uahuka, 17 collections; Uapou, 10 collections; and Eiao, 5 collections.

Kalotermes (N.) connexus is the terminal representative of a group of large, closely related species of *Neotermes,* distributed from Papua and northern Australia across the Pacific and north to the Hawaiian islands, including *K. (N.) papua* Desneux, *K. (N.) rainbowi* Hill, *K. (N.) samoanus* Holmgren, and the present species. *K. connexus* is very closely related to *K. (N.) samoanus* Holmgren.[21] More complete collections may prove them to be a single species, in which circumstance Holmgren's name would have priority.

Measurements in millimeters of a typical soldier of *Kalotermes (Neotermes) connexus* Snyder from Uapou:

Length	13.00
Head length, (with mandibles)	6.38
Head width	3.52
Pronotum length, maximum	2.22
Pronotum length, minimum	1.76
Pronotum width	4.07
Gula length	2.59
Gula width, maximum	1.16
Gula width, minimum	0.56
Length of head capsule	4.02
Length of hind tibia	2.13

Subgenus **METANEOTERMES** new subgenus

ALATE

Medium sized; about 12 mm. long with wings; antennae elongated; pronotum wider than long; hind tibia with but two apical spines; wing ornamentation coarse; median vein coalescent with radius sector throughout all or nearly all of wing membrane.

SOLDIER

Head long, rectangular; frons but little declivitous; third segment of antennae elongated, thickened and chitinized; pronotum as in *Neotermes,* broad, short, and weak, broader than head, weakly chitinized, not deeply excavate, not overhanging head. Hind tibia with but two apical spines.

Type species *Kalotermes (Metaneotermes) athertoni,* new species.

[21] Holmgren, Nils, Neue Termiten aus dem deutschen entomologischen Museum: Ent. Mitt., 1, pp. 279-282, 1912.

Kalotermes (Metaneotermes) athertoni, new species (pl. 1, *A-C*; pl. 2, *A-C*; fig. 23, *a-e*).

Alate

Generally a shining black-brown to black; head, pronotum and abdominal tergites darkest; labrum and tibiae of legs lightest.

Head (pl. 2, *C*) rather square; sides parallel, rounding into flatly convex posterior margin; head capsule about as broad as long, broader through eyes; dorsal profile nearly straight; highest at level of ocellus, dorsal surface flat; centrally broadly and irregularly excavate with a median raised area; hairing very sparse, with long stiff hairs posteriorly and very short hairs in front.

Eye moderately large; strongly projecting; somewhat truncated, truncation oblique, in front and above; eye somewhat prolonged anteroventrally; separated from dorsal and ventral margins by slightly less than short diameter and from posterior margin by about twice long diameter.

Ocellus (pl. 2, *C*) small, somewhat elongated vertically; pointed below, located just back of middle of eye and separated from it by somewhat less than half its short diameter.

Labrum not strongly vaulted; somewhat wider than long; antero-lateral corners rounded; anterior margin with broad straight or weakly convex middle zone and shorter, straight or faintly convex, receding, lateral areas; sides straight or faintly convex, converging somewhat posteriorly.

Gulamentum about two-thirds as long as wide; sides parallel in middle, nearly straight and converging at both ends, posterior margin nearly straight; posterior three-fifths and a short, median rectangular projection therefrom dark smoky-brown, remainder white, as also small irregular crescent-shaped spot near center of sclerite.

Antennae (pl. 2, *A*) smoky-black-brown; long; of 16 to 18, typically of 17, segments; when 16, third longer than second; when 17 or 18, third subequal to second or shorter; fourth usually smallest; distal segments increasing in length and breadth, club-shaped; terminal segment oval, much narrower, somewhat shorter.

Pronotum (pl. 2, *B*) more than twice as wide as long; anterior margin weakly but broadly and evenly concave; lateral portions of anterior margin somewhat convex; antero-lateral corners broadly rounded; sides convex; sides receding strongly behind into weakly emarginate posterior border.

Three long closely approximated spines on tibiae of first and second legs, two on tibia of third leg. Pulvillus well developed. Cercus of two segments; basal segment asymmetrically swollen, apical segment longer, roughened. Styles of male prominent, slender.

Wings (pl. 1, *A-C*) brown, costal veins bright shining brown; membrane light smoky-brown; a proximal patch along posterior margin darker smoky-brown; papillae large and coarse on all save costal veins, scattered on membrane, in close series on veins, close-set and minute on costal veins. Wings relatively short and broad with bluntly pointed tips. Subcosta of forewing (pl. 1, *C*) joins margin at about inner sixth, in hind wing at extreme base of wing; radius joins margin near basal one-third in both wings (pl. 1, *A-C*), median joins radius sector within basal one-fifth of forewing (pl. 1, *C*) and is never free in hind wing (pl. 1, *B*); free portion on fore wing chitinized; joint vein broad, heavy; radius sector gives rise to five to seven branches in each wing, first two long and very oblique; first oblique branch in fore wing arises within basal one-half of wing, in hind wing at about center of wing; cubitus unchitinized save briefly at base, but strongly outlined; cubitus considerably above middle of wing; with numerous faint, vertical, sometimes anastomosing superior branches to median and radius sector; cubitus runs to margin just below tip of wing; with about eight branches in each wing.

Measurements in millimeters of an alate of *Kalotermes* (*Metaneotermes*) *athertoni* new subgenus and species from Pouau, Hivaoa:

Length of wings	8.50	Compound eye, short diameter	0.25
Length of head with mouthparts	1.43	Compound eye, long diameter	0.27
Length of head capsule	1.22	Ocellus, short diameter	0.06
Head width	1.26	Ocellus, long diameter	0.11
Pronotum length, maximum	0.76	Length of hind tibia	1.05
Pronotum length, minimum	0.67	Length of forewing	7.00
Pronotum width	1.39	Width of forewing	1.50

Soldier

Head yellow-brown at posterior margin, shading through smoky-red-brown to reddish-black at anterior end; pronotum rusty-yellow with brown anterior margin; dorsal surface of thorax lighter rusty-yellow; abdominal sternites very light brownish-yellow; ventral surface dirty white, legs yellowish; tarsi light brown; claws reddish.

Head (fig. 23, *e*) long (head index about 0.68), rectangular; sides straight, parallel; postero-lateral corners shortly rounded, posterior margin straight; head low, dorsal profile straight; dorsal surface flattened in middle; sides rounding up broadly to median flattened area; frons only slightly declivitous, smooth.

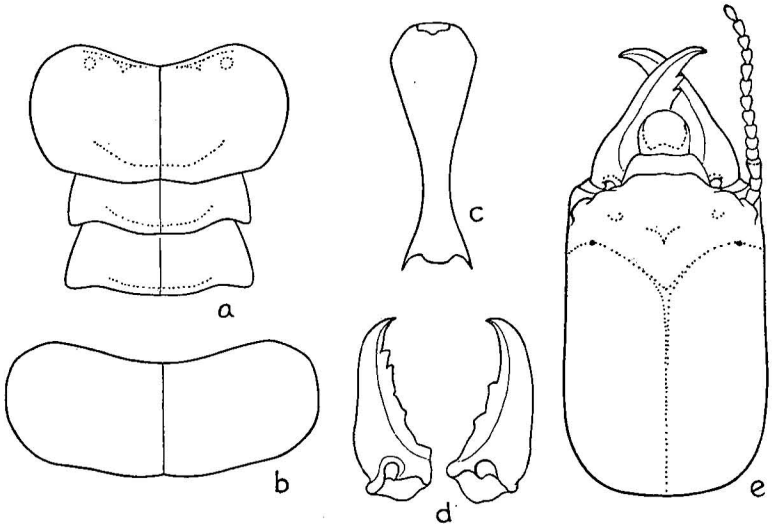


FIGURE 23. Soldier of *Kalotermes* (*Metaneotermes*) *athertoni* new subgenus new species: *a*, nota in natural position; *b*, pronotum spread flat; *c*, gula; *d*, mandibles; *e*, head. All drawings from camera lucida outlines, at same magnification.

Eyespot dorso-ventrally elongated, somewhat crescent-shaped, concave anteriorly; separated from rim of antennal foveola by more than its short diameter. Ocellus spot tiny (fig. 23, *e*), often linear, somewhat behind level of eye and separated from it by nearly once and a half the distance between eye and rim of antennal foveola.

Labrum about as long as broad; sides straight, antero-lateral corners broadly rounded; anterior margin straight; three shorter spine-like hairs on either side, two long and several shorter hairs in middle.

Mandibles (fig. 23, *d*) relatively short; tips shortly but strongly incurved; left mandible with first two teeth directed distally; right mandible with first tooth well in front of middle; second tooth directed mediad, with relatively long, convex anterior face.

Antennae (fig. 23, *e*) of 13 or 14 segments; short, not much longer than mandibles, slender; third segment somewhat enlarged, as long as first, wider than first, about once and one-half as wide as second or fourth.

Gulamentum (fig. 23, *c*) strongly narrowed from near anterior end; narrowest behind the middle; maximum width considerably more than twice minimum width.

Pronotum (fig. 23, *a, b*) weakly chitinized, broad and short, much broader than the head; more than twice as broad as long; anterior margin broadly and more or less angularly or irregularly concave, anterolateral corners rounding into convex sides; sides receding from in front of middle (in natural position); postero-lateral corners not rounded, obtuse; posterior margin convex in general; sinuous with three weak emarginations, two lateral and one median. Mesonota and metanota (fig. 23, *a*) with median emargination and laterally with well-marked wing rudiments.

Femora at least three times as wide as tibiae; spines of tibiae heavy, red; three spines on tibia of first and second leg, two on inner face and one on posterior; two inner spines on tibia of third leg, posterior spine lacking. Cerci and styles as in alates; all soldiers with styles.

Measurements in millimeters of two soldiers of *Kalotermes* (*Metaneotermes*) *athertoni,* new subgenus, new species, from Pouau, Hivaoa:

Length over all	6.66	8.00
Head length, to tip of mandible (mandibles crossed)	3.66	3.28
Length of head capsule	2.50	2.11
Head width, maximum	1.73	1.47
Pronotum length, maximum	1.12	1.01
Pronotum length, minimum	0.97	0.88
Pronotum width	2.06	1.77
Gula length	1.81	1.68
Gula breadth, maximum	0.72	0.63
Gula breadth, minimum	0.25	0.25

Nymph

Head broad; head capsule broader than long, sides of head faintly convex, rounding from near middle into weakly convex posterior margin. Pronotum very broad and short, much broader than head; about three times as broad as long; sides strongly convex; anterior and posterior margins as in the soldier.

This species was taken 33 times and from six different islands in the Marquesas; 14 times from Nukuhiva, 12 times from Hivaoa, 4 times from Uahuka, and once each from Tahuata, Fatuhiva, and Uapou.

Alates were present in colonies on dates ranging from March to as late as September. By far the most common host plant was *Hibiscus tiliaceus,* although colonies were also taken in mango and *Sapindus saponaria.* Their very dark color would suggest that they are day fliers.

Little is known of the biology and economic significance of this striking termite species.

I take pleasure in naming it for Mr. F. C. Atherton, President of the Hawaiian Sugar Planters' Association.

Subgenus CRYPTOTERMES Banks

Kalotermes (Cryptotermes) dolei, new species (pl. 3, *A, B*; fig. 24, *a, d*).

Alate

Generally brown; head somewhat lighter; prothorax and wing scales rusty; legs, antennae, and palpi yellow.

Head (fig. 24, *a*) elongated, somewhat rectangular, head capsule longer than broad; sides nearly straight, parallel; postero-lateral corners rounded; posterior margin nearly straight; head relatively high; dorsal profile nearly straight.

Eyes subtriangular; considerably elongated; pointed in middle behind and somewhat ventrally in front; separated from ventral margin and dorsal surface of head (in side view) by about their short diameter and from posterior margin by about twice their short diameter. Ocellus (fig. 24, *a*) touching eye at about its middle; asymmetrically broadened below, drawn out into point in continuation with transverse head suture. Third segment of antennae chitinized, club-shaped, longer than second.

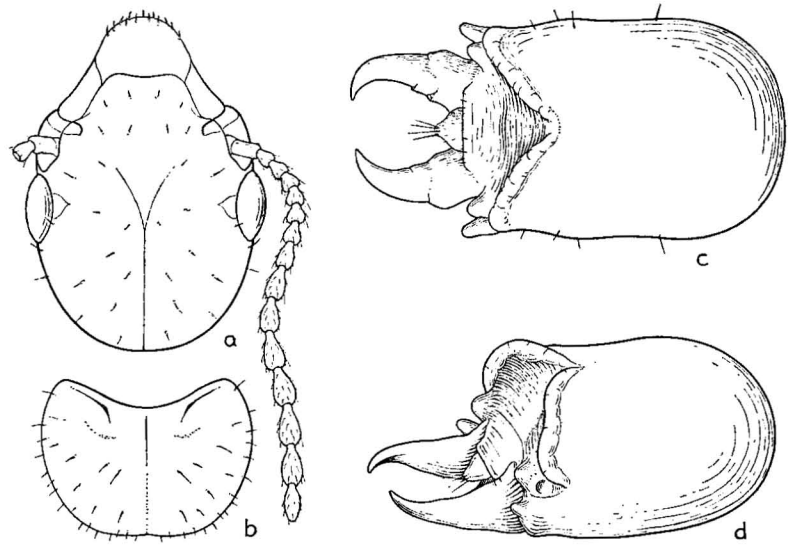


FIGURE 24. *Kalotermes (Cryptotermes) dolei,* new species: *a,* head of alate; *b,* pronotum of same; *c,* head of soldier in dorsal view; *d,* head of soldier in oblique lateral view to show configuration of frontal area. From camera lucida outlines.

Pronotum (fig. 24, *b*) about twice as broad as long; anterior margin concave; antero-lateral corners shortly rounded; sides convex, receding from near middle and rounding into faintly emarginate, nearly straight, posterior margin.

Forewing scales reaching beyond middle of metanotum; overlapping in center. Wings (pl. 3, *A, B*) a warm translucent light brown; costal veins a rich dark golden-brown; papillae large, scattered; subcosta of forewing united with margin throughout membrane; radius joining margin at inner one-third; radius sector with 4 or 5 longer and 2 very short distal branches, first branch at inner one-third of wing; median and cubitus and branches broad; all save basal four cubital branches marked with a series of large, widely spaced papillae; on these they are close-set, smaller, and sometimes double; median lies nearer cubitus than radius sector to beyond middle of wing where

it curves upward to join radius sector between its second and third branches, at about distal third of wing; cubitus lying at about center of wing membrane, with about 10 branches.

Measurements in millimeters of three alates of *Kalotermes* (*Cryptotermes*) *dolei*, new species, from Hivaoa:

Length over all	8.50	8.50	8.00
Length of head (to tip of labrum)	1.33	1.26	1.26
Length of head capsule	0.95	0.91	0.93
Width of head (across eyes)	1.01	0.97	0.96
Pronotum length, maximum	0.55	0.55	0.59
Pronotum length, minimum	0.51	0.51	0.52
Pronotum width	0.93	0.88	0.90
Compound eye, short diameter	0.23	0.25	0.22
Compound eye, long diameter	0.29	0.25	0.26
Ocellus, short diameter	0.08	0.09	0.09
Ocellus, long diameter	0.14	0.14	0.10
Length of forewing	6.75	7.00	6.50
Width of forewing	1.75	1.50	1.75
Length of hind tibia	0.84	0.80	.....

Soldier

Head shading from pale dirty yellow-brown behind through red-brown to black in front; cervical sclerites and anterior margin of pronotum brown; remainder dirty whitish-yellow to pale diffuse dirty brown.

Head (fig. 24, *c, d*) short, broad and high; subquadrangular in dorsal view; sides straight or slightly convex; nearly parallel or converging slightly anteriorly; widest near posterior end; postero-lateral corners rounded into weakly convex posterior margin; dorsal profile (fig. 24, *d*) elevated in front at anterior flaring rim, sunken just behind rim, rising to maximum at posterior one-third and rounding sharply to posterior margin; frons black, high, concave, with black flaring rims in two lobes set off by broad, deep, angular excavation in middle; head constricted on sides and above just posterior to rim; concavity of frons, rim of frons, and constricted zone inconspicuously roughened; dorsal surface of head with inconspicuous transverse wrinkles; a prominent, transversely elongated mound (frontal spine) located on either side just below rim and mediad to antennal foveola with rim of which it is continuous laterally; frontal spine projecting beyond level of frontal rim; antero-lateral corners of head capsule below drawn out into a flat, laterally and anteriorly directed "antennal spine"[22] projecting about to level of frontal spine in front; rim of frons above, frontal spine medially, and antennal spine below limit a deep fossa within which lies the antennal foveola.

Eyespots dull dirty white, vertically elongated, separated from rim of antennal foveolae by at least twice their short diameter.

Labrum flat, much broader than long; sides nearly straight, parallel; antero-lateral corners very shortly rounded; anterior margin triangular; with sharp median point or papilla-like projection bearing five long, slightly radiating hairs.

Mandibles as in figure 24, *c*; right practically toothless save for short shelf-like projection at level of basal thickening; left with long, low vestiges of second and third teeth and a sharp projection at level of basal thickening.

Antennae short and light, shorter than head; of 12 segments; third shortest and narrowest, obconic; fourth and fifth subcylindrical; sixth to eleventh shortly and broadly obconic; twelfth short, oval. Gulamentum broadest behind, tapering to narrow anterior end; posterior margin rounded; dark red-brown posteriorly, whitish anteriorly.

Pronotum deeply, broadly, and angularly concave; antero-lateral corners bluntly pointed; sides strongly concave; receding strongly from middle into straight posterior margin.

[22] Light, S. F., Notes on Philippine termites, 3; Philippine Jour. Sci. 40, pp. 421-453, 1929.

Measurements in millimeters of two soldiers of *Kalotermes* (*Cryptotermes*) *dolei*, new species, from Hivaoa:

Length over all (with mandibles)	5.75	5.00
Length of head (to tip of mandibles)	2.11	2.06
Length of head capsule	1.64	1.58
Head width	1.23	1.31
Pronotum, maximum length	0.72	0.72
Pronotum, minimum length	0.59	0.55
Pronotum width	1.10	1.03
Gula length	.....	1.22
Gula width, maximum	.....	0.72
Gula width, minimum	.....	0.23
Length of hind tibia	0.59	0.80

The soldier of this species differs widely from those of previously described species in the long, narrow head, the less than vertical frons, the widely flaring frontal rim, broadly and deeply notched, and in the relatively smooth, level dorsal surface of the head. These characters separate it sharply from the two chief species groups of the subgenus, the *Cryptotermes domesticus* group (*Cr. domesticus* Haviland, *Cr. campbelli* Light, *Cr. kotoensis* Oshima, *Cr. buxtoni* Hill, *Cr. gulosus* Hill, *Cr. hermsi* Kirby, etc.), in which the head of the soldier, although medianly notched, has in general a bulging outline in front, and the *Cryptotermes brevis* group (*Cr. brevis* Walker, *Cr. piceatus* Snyder etc.), in which the soldier has a greatly roughened, sunken dorsal and frontal surface. In most of these characters it approaches *Planocryptotermes nocens* Light of the Philippines, but the head of *Cr. dolei* new species is much narrower and higher in position.

The alate is very different from that of *P. nocens* in its much smaller size, much less elongated antennal segments, and in the coarse decorations of the wings. It is nearest, perhaps, to *Cryptotermes albipes* Holmgren, but it differs in being much lighter, save for the tibiae, which are yellower, in that the median joins the radius sector typically at the point of origin of its third branch, and, most strikingly, perhaps, in a paucity of inferior branches of the cubitus, which are about 10 in number.

The twenty collections of *Cryptotermes dolei* new species are all from the Marquesas, representing seven islands. Eight are from Hivaoa, five from Mohotani, two each from Uapou and Eiao, and one each from Fatuhiva, Nukuhiva, and Uahuka. For it, as for the other species of *Kalotermes* sensu latiore, *Hibiscus tiliaceus* was the common host plant. Others were *Sapindus saponaria, Cordia subcordata,* mango, *Morinda citrifolia,* and *Xylosma suavolens.* The only swarming alates were taken in October, but alates are present in nest collections taken in February, March, and June.

Kalotermes (Cryptotermes) hermsi Kirby (pl. 3, *C*).

Cryptotermes hermsi Kirby, Univ. Calif. Pub. Zool. 26, pp. 437-441, figs. 1-12, 1925.

This species, previously taken by Kirby at Fanning Island, is represented by four collections from Atuona, Hivaoa, and two from Hanahevane Valley, Tahuata. Swarming alates were taken twice (Hivaoa), once in February and once in May. The two nest series from Hivaoa were from mango and the two from Tahuata from a *Sapindus* log.

Kalotermes (Cryptotermes) piceatus Snyder (pl. 3, *D*).

Cryptotermes piceatus Snyder, U. S. Nat. Mus. Proc. 61, pp. 14-16, pl. 5, figs. 19 and 20, 1922.

Kalotermes piceatus is the common "house termite" of Hawaii. Dr. Snyder reports that it has been taken in materials imported from Hongkong. This raises the question as to whether the species is indigenous to Oceanica and introduced thence to Hongkong or has been carried from Hongkong to Hawaii and thence or independently to the Marquesas. I was unable to find any indication of a house termite in Hongkong and the only Chinese species collected by me, *Cryptotermes campbelli* Light, is from Hainan and differs widely from *Cr. piceatus,* being of the *Cr. domesticus* type. A single collection was made by the Survey of alates of this species swarming about lights at Atuona, Hivaoa, in February, 1929.

Genus COPTOTERMES Wasmann

Coptotermes pacificus, new species (pl. 3, *E, F*; fig. 25, *a, b*).

Alate

Moderately dark brown above, abdominal sternites light brown, yellow in center; ventral surface of thorax and bases of legs whitish yellow or yellow-brown; tibiae light brown; tarsi light yellow, antennae, labrum, and palpi light brown.

Head (fig. 25, *a*) broad; head capsule broader than long; sides straight in front (masked by projecting eyes); rounding broadly from posterior margin of eyes into somewhat convex posterior margin; head low, highest at level of ocelli; profile descending anteriorly and posteriorly from ocelli; dorsal surface of head somewhat flattened; with a transverse sunken area just behind level of ocellus, containing fontanel; fontanel very small, its position marked by a small white, often elongated, spot; antennal spots (fig. 25, *a*) conspicuous, broadly half-moon shaped with convexity behind, separated from ocellus by about half of short diameter of spot and less than half of short diameter of ocellus; head with scattered long, erect, spinelike hairs and numerous shorter forwardly directed, somewhat curved hairs of various lengths.

Eye large, subcircular, slightly longer than high, weakly truncated anterodorsally; separated from ventral margin by slightly less than its diameter, from dorsal surface by about one-third its diameter and from posterior margin by a little more than its long diameter.

Ocellus (fig. 25, *a*) oval, about two-thirds as wide as long, almost in contact with eye; directed obliquely upward and anteriorly, making an angle of about 45° with long axis of head; narrow in dorsal view due to slope of side of head.

Labrum about as broad as long; sides convex, rounding broadly into rounded anterior margin with somewhat reduced, flat-margined median area; sides basally converging, nearly straight. Postclypeus light yellow; short, four times as broad as

long; anterior broadly, evenly, and shallowly concave; posterior margin broadly, evenly, and shallowly convex. Antennae (fig. 25, *a*) of 18 or 19 segments; third shortest, often disc-shaped. Gulamentum broadest behind, sides straight, converging anteriorly, antero-lateral and postero-lateral corners shortly rounded, anterior margin straight; posterior margin faintly convex, anterior one-fourth white, remainder yellow.

Pronotum (fig. 25, *b*) about twice as broad as long; anterior margin broadly, very shallowly, and somewhat angularly concave; sides convex, receding from near anterior end; posterior margin biconvex.

Wings (pl. 3, *E, F*) very light, membrane white, costal veins and first two or three branches of cubitus yellow; costal veins basally darkened; no costal stripe; no visible micrasters; hairs short, not close-set, transparent; marginal hairs short; median runs above middle of wing, branching distally, cubitus with about nine branches in each wing.

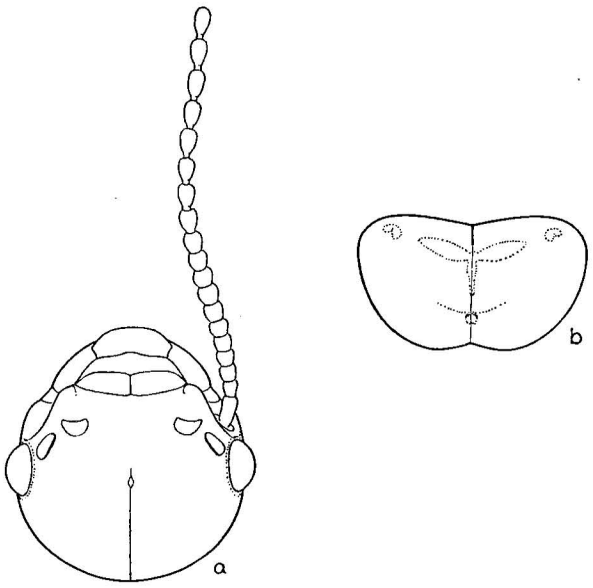


FIGURE 25. *Coptotermes pacificus,* new species: *a,* head of alate; *b,* pronotum. From camera lucida outlines.

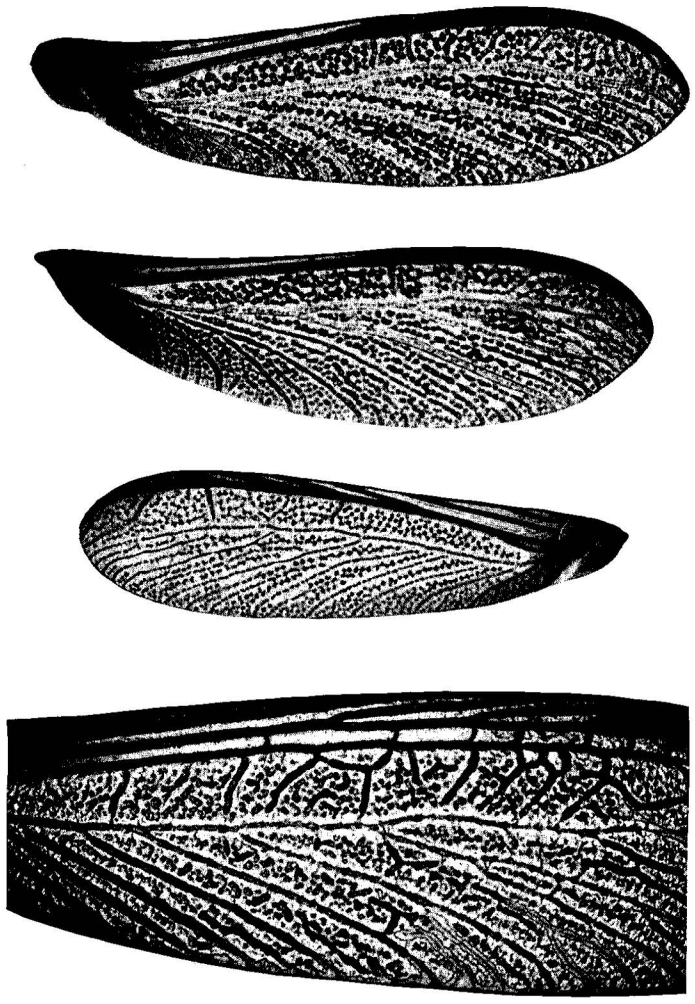
Measurements in millimeters of two alates of *Coptotermes pacificus,* new species:

Length over all	12.50	11.75
Length of forewing	10.50	9.25
Width of forewing	3.00	2.25
Head length	1.52	1.43
Length of head casule	1.12	1.09
Head width	1.45	1.37
Pronotum length, maximum	0.80	0.76
Pronotum length, minimum	0.72	0.67
Pronotum width	1.33	1.22
Compound eye, short diameter	0.32	0.29
Compound eye, long diameter	0.38	0.34
Ocellus, short diameter	0.13	0.13
Ocellus, long diameter	0.17	0.17
Length of hind tibia	1.18	1.22

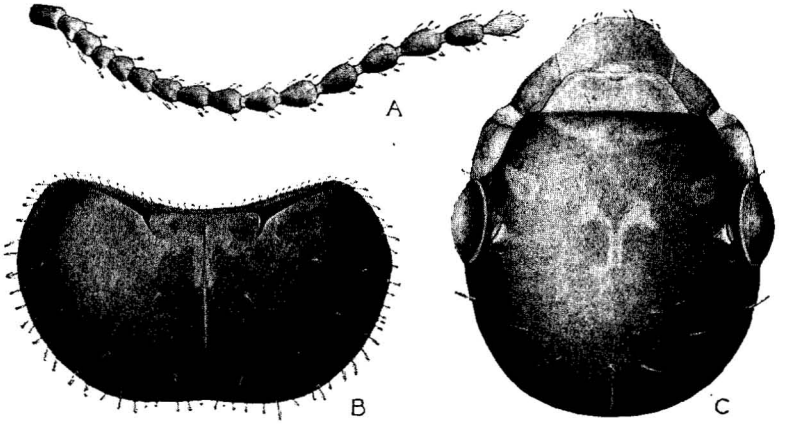
Coptotermes pacificus is most closely related to the Oriental species of the genus. Indeed, it is very similar to the common Philippine species, *C. vastator* Light.[23] Certain small differences and the great geographical gap make it necessary to consider it a separate species as yet. The head, for example, seems to be smaller, broader in proportion, and less rounded behind, the ocellus larger, longer, and the antennae shorter. More extensive material including soldiers may prove it to belong to this species, in which circumstance introduction would seem to be the explanation of its presence thus far afield. As I have already pointed out, this species has been intercepted at Honolulu on several occasions. It differs most strikingly from *Coptotermes formosanus* Shiraki, the introduced species of Hawaii, in its smaller size and, for example, in having crescent-shaped antennal spots. Hill reports it as distinct from any known Australian termite but nearest to *C. acinaciformis.*

The species of this genus are responsible for a very large part of the damage to wooden structures by termites throughout the tropics and subtropical regions. Their economic status and potentiality in the Marquesas should be ascertained and proper preventive measures adopted.

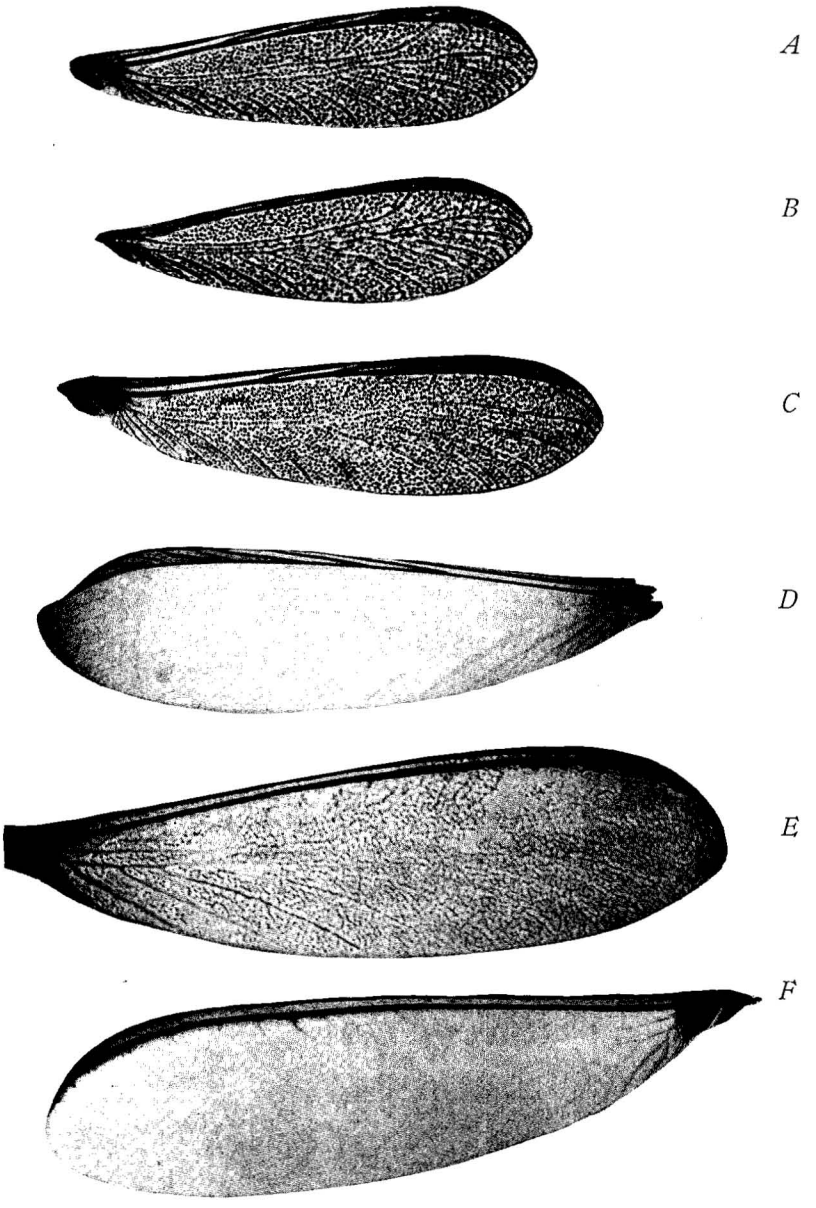
[23] Light, S. F., Notes on Philippine termites, 3: Philippine Jour. Sci. 40, pp. 421-453, 1929.



WINGS OF *KALOTERMES*: *A*, FORE WING OF LARGE INDIVIDUAL OF *KALOTERMES* (*METANEOTERMES*) *ATHERTONI* NEW SUBGENUS, NEW SPECIES; *B*, HIND WING OF *K. ATHERTONI; C*, FORE WING OF SMALL INDIVIDUAL OF *K. ATHERTONI; D*, PORTION OF FORE WING OF *KALOTERMES* (*NEOTERMES*) *CONNEXUS* SNYDER. (ALL TAKEN DRY ON THE SLIDE TO BRING OUT CHARACTERISTIC WING ORNAMENTATION; ALL × 10 ±).



ALATE OF *KALOTERMES* (*METANEOTERMES*) *ATHERTONI* NEW SUBGENUS, NEW SPECIES: *A*, ANTENNA OF ALATE; *B*, PRONOTUM OF ALATE; *C*. HEAD OF ALATE. DRAWINGS FROM CAMERA LUCIDA OUTLINES.



PHOTOMICROGRAPHS OF WINGS OF MARQUESAN TERMITES: *A*, FORE WING OF *KALOTERMES* (*CRYPTOTERMES*) *DOLEI* NEW SPECIES; *B*, HINDWING OF *K.* (*C.*) *DOLEI*; *C*, FORE WING OF *K.* (*C.*) *HERMSI* KIRBY; *D*, FORE WING OF *K.* (*C.*) *PICEATUS* SNYDER SHOWING MUCH LARGER SIZE, WEAK ORNAMENTATION, AND TENDENCY OF MEDIA TO REMAIN SEPARATE, THUS APPROACHING WING CHARACTERS OF KALOTERMES SENSU STRICTO; *E*, WING OF *COPTOTERMES PACIFICUS*, NEW SPECIES, SHOWING SURFACE ORNAMENTATION; *F*, WING OF *COPTOTERMES PACIFICUS*, NEW SPECIES, FROM STAINED MOUNT IN BALSAM. (ALL SAVE *F* TAKEN DRY ON SLIDE TO BRING OUT CHARACTERISTIC WING ORNAMENTATION; ALL × 9 ±).